

Claims

1. A safety tire device mountable on a vehicle wheel having a tire thereon with a tread portion for engaging a supporting surface, said device having, in combination:
  - a body mountable on the side of the wheel;
  - a plurality of generally radially extending traction arms having traction elements on the outer ends of said arms, said arms being mounted on said body for movement between retracted positions in which said traction elements lie alongside the tire and extended positions in which the traction elements overlie the tread portion of the tire;
  - and power actuators mounted on said body and drivingly connected to said traction arms to move the arms between said retracted and extended positions.
2. A safety tire device as defined in claim 1 wherein said traction arms are elongated plastic arms and said traction elements are integrally formed as the outer end portions of said arms.
3. A safety tire device as defined in claim 2 wherein said traction elements are joined to said arms by integral bends for generally following the contour of the tire.
4. A safety tire device as defined in claim 3 wherein said traction arms are generally L-shaped when free, the traction elements being joined to the traction arms by ninety-degree bends.
5. A safety tire device as defined in claim 2 wherein said traction arms are arcuately curved.
6. A safety tire device as defined in claim 5 wherein said traction elements are the outer end portions of traction arms that are substantially uniform width along their entire lengths.
7. A safety tire device as defined in claim 5 wherein said traction elements are enlarged flat pads on the outer ends of the traction arms.
8. A safety tire device as defined in claim 1 wherein said traction elements have bumps thereon for increasing the traction between the elements and the surface.
9. A safety tire device as defined in claim 1 wherein said traction elements have openings therein for increasing the traction between the elements and the surface.

10. A safety tire device as defined in claim 1 wherein said power actuators are connected to said arms by rack-and-pinion drive couplings for extending and retracting the traction arms.

11. A safety tire device as defined in claim 10 wherein said actuators drive pinion gears that engage racks formed in said traction arms.

12. A safety tire device as defined in claim 10 wherein each of said actuators drives two pinion gears engaged with two racks on said traction arms.

13. A safety tire device as defined in claim 12 wherein each of said actuators is disposed between two of said traction arms and is engaged with two racks disposed on opposite sides of said actuator.

14. A safety tire device as defined in claim 13 wherein said actuators are coupled to said pinion gears by T-drive connections.

15. A safety tire device as defined in claim 12 wherein each of said pinions is a double pinion engaging two racks on one of said traction arms.

16. A safety tire device as defined in claim 15 wherein said racks are formed by rows of slots in opposite edge portions of the traction arms.

17. A safety tire device as defined in claim 10 wherein said racks comprise rows of teeth formed on said traction arms.

18. A safety tire device as defined in claim 14 wherein said shafts are flexible to accommodate lateral movement of the traction arms.

19. A safety tire device as defined in claim 1 wherein said traction arms are mounted on said body for radial movement thereon and are yieldable laterally on the body, and further including springs acting between said body and said traction arms to hold the traction arms yieldably in generally radial positions.

20. A safety tire device as defined in claim 1 including means defining hand holes in said traction arms adjacent said traction elements for manual movement of the arms.

21. A safety tire device as defined in claim 1 wherein said power actuators are linear actuators including generally radial spring coils extending outwardly from the actuators and

connected to said traction arms to move the traction arms between said positions.

22. A safety tire device as defined in claim 1 wherein each of said traction arms is guided for generally radial movement in a first bracket on said body and a second bracket overlies the arm and carries a roller that is yieldably urged toward the arm, and further including a first annular series of springs between and first brackets yieldably positioning the first brackets on said body, and a second annual series of springs between said second brackets yieldably positioning the second brackets over the traction arms.

23. A safety tire device as defined in claim 21 wherein each of said traction arms is formed with an elongated longitudinal slot, and said rollers overlie said slots.

24. A safety tire device as defined in claim 1 wherein said power actuators are rotary motors mounted on said body alongside said traction arms and each having an output gear drivingly engaging a rack formed on one of the traction arms.

25. A safety tire device as defined in claim 1 wherein said traction arms are elongated spring coils and said traction elements are portions of said coils, said power actuators comprising cylinders for extending and retracting the spring coils and having nozzle outlets positioned on said body to be disposed alongside the tread portion of the tire for directing the coils onto said tread portions into the extended positions.

26. A safety tire device as defined in claim 25 wherein each of said actuators comprises a radially disposed cylinder attached to said body and having a radially outer end spaced inwardly from the tread portion of the tire and having an extension carrying a nozzle having an open end directed across the tread portion of the tire, said spring coils being extendable and retractable through said open ends of said nozzles.

27. A safety tire device as defined in claim 26 wherein said extensions are hollow spring coils.

28. A safety tire device as defined in claim 26 wherein said cylinders are selected from the group comprising hydraulic cylinders, electromagnetic solenoids, and rotary electric motors having screw mechanisms that produce linear output.

29. A safety tire device as defined in claim 25 wherein nozzles are L-shaped and said traction elements are free end portions of the spring coils.

30. A safety tire device as defined in claim 26 wherein said nozzles are Y-shaped, each having two open ends for extending and retracting two spring coils, and said spring coils are mounted at opposite ends in adjacent nozzles to be disposed generally along a chord of the periphery of the tire in the retracted position and to be disposed in a V-shaped active position across the tread portion of the tire in the extended position.

31. A safety tire device as defined in claim 1 wherein said device is mountable on the hub of a vehicle wheel and comprises:

a wheel rim mountable on the hub and having axially outwardly extending connectors thereon for connection to said body, said body comprising a cover secured to said connectors and a base plate mounted between said cover and said hub and supporting said power actuators, said traction arms being guided between said body and said wheel rim for movement between said positions.

32. A safety tire device as defined in claim 31 wherein said traction arms comprise arcuately curved elements generally following the curvature of the tire and guided into retracted positions in which the inner end portions of the elements are inside said wheel rim.

33. A safety tire device as defined in claim 32 wherein said wheel rim has first roller guides thereon positioned to receive and hold the inner ends of the traction arms in the retracted positions.

34. A safety tire device as defined in claim 33 wherein said cover has second roller guides therein engaging said traction arms in the extended positions and positioned to guide said traction arms into engagement with the first roller guides in the retracted positions.

35. A safety tire device as defined in claim 34 wherein said power actuators include drive pinions engaging racks on said traction arms between said first and second roller guides.

36. A safety tire device as defined in claim 1 wherein said power actuators are electric motors, and wherein said device includes a source of electric power.

37. A safety tire device as defined in claim 36 wherein said source is a battery pack.

38. A safety tire device as defined in claim 37 wherein said device further includes a generator connected to said battery pack and responsive to motion of the wheel to charge the battery pack.

39. A safety tire device as defined in claim 1 further including a remote control for activating said power actuators.

40. A safety tire device as defined in claim 1 wherein said device includes a receiver for activating said power actuators in response to signals from a remote control.

41. A safety tire device as defined in claim 1 wherein said device includes a heater.